

**What is Claimed Is:**

1. A structure for coupling an electrical signal on a substrate to a waveguide, the substrate having substrate layer with a first major surface and a second major surface, the waveguide having a first end, a second end, and a housing disposed between the first and second ends, the housing having one or more walls and defining a longitudinal dimension  
5 between the first and second ends along which electromagnetic waves propagate, the one or more walls forming a lip at the first end, the structure comprising:

a ground ring located on the first major surface of the substrate layer and adapted for contact with the lip at the waveguide's first end, said ground ring enclosing a first area;

- 10 a patch antenna disposed on the first major surface of the substrate layer or within the substrate layer, and located within or below said first area; and

a ground plane disposed on the second major surface of the substrate layer and located opposite to at least said first area.

2. The structure of Claim 1 wherein said ground plane is further located opposite to at least said ground ring.

3. The structure of Claim 1 further comprising a conductive trace disposed on the second major surface of the substrate layer or within the substrate layer; and

a conductive via formed in the substrate layer, said conductive via being electrically coupled to said patch antenna and to said conductive trace.

4. The structure of Claim 3 wherein a portion of said ground plane extends to underlie at least a portion of said conductive trace.

5. The structure of Claim 1 wherein said ground ring is electrically coupled to said ground plane.

6. The structure of Claim 5 further comprising a conductive via formed in said substrate layer, said conductive via being electrically coupled to said ground ring and to said ground plane.

7. The structure of Claim 1 further comprising a capacitive diaphragm disposed on the substrate layer's first major surface or within the substrate layer, and located between said patch antenna and said ground ring.

8. The structure of Claim 7 wherein said capacitive diaphragm is electrically coupled to said ground ring.

9. The structure of Claim 7 further comprising a conductive trace disposed on the substrate layer's second major surface or within the substrate layer, said conductive trace having a first portion overlying a portion of said patch antenna, a second portion overlying a portion of said capacitive diaphragm, and a third portion overlying a portion of said ground ring; and

a conductive via formed in the substrate layer, said conductive via being electrically coupled to said patch antenna and to said conductive trace.

10. A structure for coupling an electrical signal on a substrate to a waveguide, the substrate having substrate layer with a first major surface and a second major surface, the waveguide having a first end, a second end, and a housing disposed between the first and second ends, the housing having one or more walls and defining a longitudinal dimension between the first and second ends along which electromagnetic waves propagate, the one or more walls forming a lip at the first end, the structure comprising:

a ground ring located on the substrate layer's first major surface adapted for contact with the lip at the waveguide's first end, said ground ring enclosing a first area;

a patch antenna disposed on the substrate layer's first major surface or within the substrate layer between its first and second major surfaces, and located within or below said first area; and

a capacitive diaphragm disposed on the substrate layer's first major surface or within the substrate layer between its first and second major surfaces, and located between said patch antenna and said ground ring.

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12. The structure of Claim 10 wherein said capacitive diaphragm is electrically coupled to said ground ring.

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13. The structure of Claim 10 further comprising a conductive trace disposed on the substrate layer's second major surface or within the substrate layer between its first and second major surfaces, said conductive trace having a first portion overlying a portion of said patch antenna, a second portion overlying a portion of said capacitive diaphragm, and a third portion overlying a portion of said ground ring; and

a conductive via formed in the substrate layer, said conductive via being electrically coupled to said patch antenna and to said conductive trace.

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14. A structure for coupling an electrical signal on a substrate to a waveguide, the substrate having substrate layer with a first major surface and a second major surface, the waveguide having a first end, a second end, and a housing disposed between the first and second ends, the housing having one or more walls and defining a longitudinal dimension between the first and second ends along which electromagnetic waves may propagate, the one or more walls forming a lip at the first end, the structure comprising:

a closed-loop strip of conductive material located on the substrate layer's first major surface, said strip of conductive material comprising a shape which is a substantial mirror image of the lip at the waveguide's first end;

a first area disposed on the substrate layer's first major surface and disposed within said closed-loop strip of conductive material;

a first conductive pad disposed on the substrate layer's first major surface or within the substrate layer between its first and second major surfaces, and further located within or below said first area, said conductive pad being separated from said closed-loop strip of conductive material;

a second area disposed on the substrate layer's second major surface and located opposite to at least said first area; and

a first layer of conductive material disposed on the substrate layer's second major surface and located within said second area.

<sup>14</sup>  
15. The structure of Claim <sup>13</sup>~~14~~ wherein said first layer of conductive material is further located opposite to at least said closed-loop strip of area.

<sup>15</sup>  
16. The structure of Claim <sup>13</sup>~~14~~ further comprising a conductive trace disposed on the substrate layer's second major surface or within the substrate layer between its first and second major surfaces; and

5 a conductive via formed in the substrate layer, said conductive via being electrically coupled to the first conductive pad and to the conductive trace.

<sup>16</sup>  
17. The structure of Claim <sup>13</sup>~~14~~ wherein said closed-loop strip of conductive material is electrically coupled to said first layer of conductive material.

<sup>17</sup>  
18. The structure of Claim <sup>16</sup>~~17~~ further comprising a conductive via formed through the substrate layer, said conductive via being electrically coupled to said closed-loop strip of conductive material and to said first layer of conductive material.

<sup>18</sup>  
19. The structure of Claim <sup>13</sup>~~14~~ further comprising a second pad of conductive material disposed on the substrate layer's first major surface or within the substrate layer between its first and second major surfaces, and further located between said first conductive pad and said closed-loop strip of conductive material.

<sup>19</sup>  
20. The structure of Claim <sup>18</sup>~~19~~ wherein a portion of said second pad of conductive material adjoins to a portion of said closed-loop strip of conductive material and electrically coupled thereto.

<sup>20</sup>  
~~21~~. The structure of Claim <sup>18</sup>~~19~~ further comprising a conductive trace disposed on the substrate layer's second major surface or within the substrate layer between its first and second major surfaces, said conductive trace having a first portion overlying a portion of said first conductive pad, a second portion overlying a portion of said second conductive pad, and a third portion overlying a portion of said closed-loop strip of

5 conductive material; and  
a conductive via formed in the substrate layer, said conductive via being electrically coupled to said first conductive pad and to said conductive trace.

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